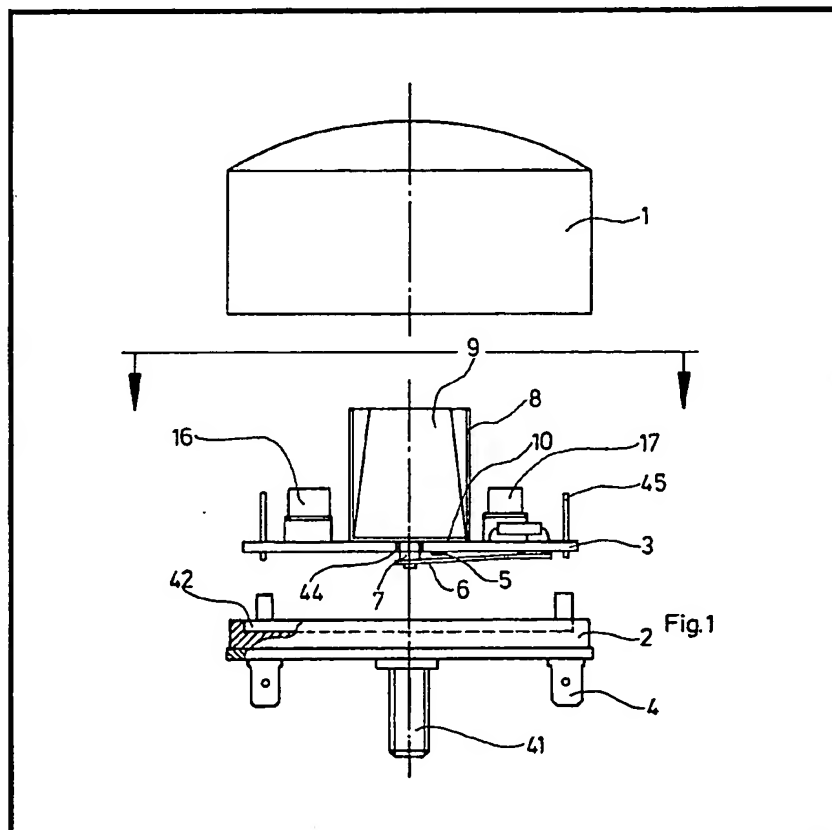


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**(54) Acceleration limit value
switch for use on motor vehicle**

(57) In an acceleration limit value switch for controlling an anti-collision light system in motor vehicles, a permanent magnet 9 loosely resting on an iron plate 10 on a circuit board 3 is deflected as a result of acceleration and, by means of a switching element 7 releases a sprung contact 6 against a fixed contact 5. Connexions to associated circuit components, which are all mounted on the upper side of the circular circuit board, are via pins 45. Contact terminals 4 in a base 2 register in slots (e.g. 46, Fig. 2, not shown) in the board 3, the latter resting in a recess 42. Terminals 4 and pins 45 are then near each other and may be readily connected. The circuitry (Fig. 3 not shown) provides for continual operation of the light system after the switch contacts 5, 6 are separated again.

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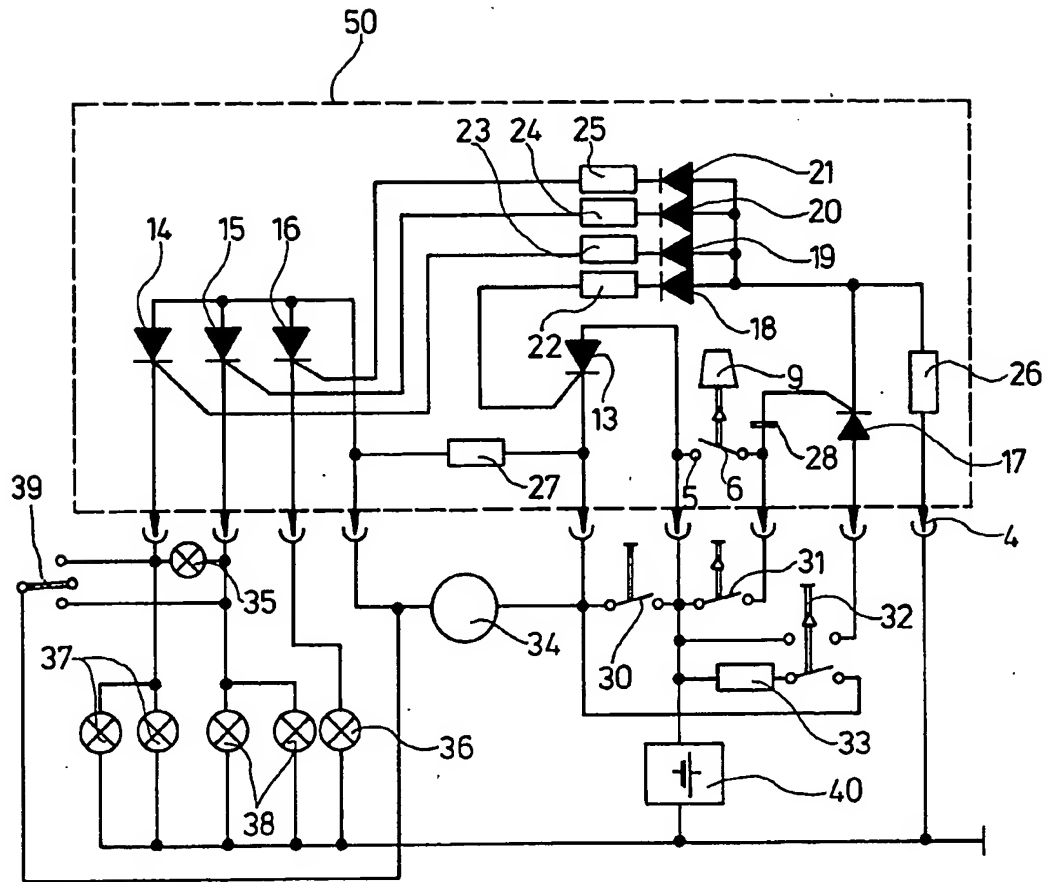


Fig. 3

SPECIFICATION

Acceleration limit value switch for use on motor vehicle

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The invention relates to an acceleration limit value switch, for use on motor vehicles for controlling an anti-collision light system, of the kind having a cylindrically symmetrical, permanently magnetic actuating member loosely carried on an iron plate and positioned with clearance within a coaxially arranged limiting tube and which acts on a switching element extending along the axis of cylindrical symmetry through a hole in a iron plate, said element under such loading keeping open a switch comprising a contact and an opposed restoring spring means.

Acceleration limit value switches of this kind are fixed on the vehicle and are operated in the case of a sudden impact which exceeds a predetermined limit value. Such impacts occur in the case of an accident, emergency braking or other emergency situations and automatically bring about the switching on of an anti-collision light system in order to immediately protect the vehicle, without any action having to be taken by the driver, who is possibly suffering from shock.

At the time of the switching, in the case of the acceleration limit value switch according to German Patent 2412807, the actuating member is briefly tilted from its position on the iron plate, so that the actuating member can give way under the spring tension of the contact switch and at least briefly closes the latter. This closing pulse serves to switch on the anti-collision light system provided on the vehicle. However, this switch on process requires complicated and costly circuitry measures on the anti-collision light system in the case of limit value switches according to said Patent, and it is the object of the present invention to so further develop an acceleration limit value switch of the kind defined hereinbefore that it can be functionally connected to the anti-collision light system without complicated circuitry being required thereon. It is also intended that the thus automated anti-collision light system can be made manually operable.

According to the present invention, this problem is solved in that, in a limit value switch of the kind referred to, there is provided a circular circuit board on the upper face of which are centrally mounted the iron plate and the limiting tube and about them the circuit members, and in that the switch contact and the leads are positioned on the underside of the circuit board, and in that the circuit board has centrally a hole for the switching element, and in that the leads and the circuit members form a circuit which can be switched on by the contact switch for controlling direction indicator lamps during

operation of the anti-collision light system.

The circuit placed on the board can easily be developed in such a way that the normal operation of the anti-collision light system and also the direction indicator are not impaired, and the anti-collision function is put into operation as soon as the actuating member releases the contact switch and provides contact for the same.

The way in which this can be obtained from the circuitry standpoint is described in greater detail hereinafter relative to an embodiment.

According to a preferred construction of the invention, which is particularly characterised by simple and well-arranged assembly, there is provided a circular base plate to the bottom of which is fitted centrally a fixing member and which has plugs distributed round the edge thereof, said plugs projecting from the base plate on the other side, said base plate having at the top a recess in which the equipped circuit board is fitted in form-locked manner with its bottom facing the base plate, whilst on the edge of the circuit board there are provided recesses for the individual rearward extensions of the plugs, through which recesses the latter project when the circuit board is fitted, and alongside said recesses there are provided on the top of the circuit board soldering pins which, when the circuit board is mounted in the base plate, are electrically connected with the associated rearwards extensions of the plugs.

An embodiment of the invention is described in greater detail hereinafter with reference to the accompanying drawings, wherein:—

Figure 1 shows an acceleration limit value switch, according to the invention, viewed from the side and shown in the disassembled state for reasons of clarity;

Figure 2 is a plan view in accordance with the arrow II of Fig. 1;

Figure 3 shows the electrical circuit of the acceleration limit value switch of Figs. 1 and 2 connected to a motor vehicle anti-collision light system.

In the drawings, 3 is a circular circuit board made from a rigid insulating material, mounted on the top of which and in a central position is a circular iron plate 10, and surrounding the plate a limiting tube 8. A permanently magnetic, heavy, cylindrical actuating member 9 is mounted in the limiting tube 8 with an adequate tolerance so as to permit tilting movements. Actuating member 9 normally occupies the position shown in Fig. 1, but in the case of impacts it is tilted to the side. The iron plate 10 and the circuit board 3 have a coaxial central hole 44 through which projects a contact pin 7 located on a contact spring 6. With actuating member 9 mounted, contact pin 7 forces the contact spring downwards in the manner shown and holds it away from an opposite contact 5 arranged in sta-

tionary manner on the bottom of circuit board 3. If, in the case of an impact, the actuating member 9 is tilted to the side, the contact spring can be displaced upwards, due to its inherent spring tension and comes into contact with opposite contact 5. As a result of this contacting action, the anti-collision light system is switched on, as will be described in greater detail hereinafter.

The circuit elements of an electric circuit, whose connections are mainly located on the bottom of the circuit board are arranged around the limiting tube 8 on the top of circuit board 3. Soldering pins, e.g. soldering pin 45, are used for connecting this circuit. Circuit board 3 fits into a recess 42 of a base plate 2, which with a dome 1 also forms a casing. A bolt 41 is fixed to the bottom of base plate 2, and plugs, e.g. plug 4, project from all round the edge of said plate when their rearwards extensions pass through corresponding recesses, e.g. recesses 43, 46. When the circuit board is fitted, these rearward extensions are located alongside the soldering pins and connected with the latter, so that the electric circuit arranged on the circuit board and controlled by the contact switches formed by contacts 5 and 6 can be connected to the circuit in the motor vehicle by insertion in a corresponding coupling piece.

In Fig. 3, the circuit symbols are provided with reference numerals. The same reference numerals are given in Fig. 1 to the circuit elements corresponding to these symbols, provided that they are visible therein. The circuit on circuit board 3 is indicated by the dotted line frame 50 in Fig. 3. When the acceleration limit value switch is fitted, it is connected by means of the plugs, e.g. plug 4, and couplings, e.g. coupling 51, located in the vehicle to the circuit which is already present in the vehicle or which is subsequently installed, it being shown outside the dotted frame in Fig. 3 to the extent that it is significant for the anti-collision function. Thyristors 13, 14, 15, 16, 17, diodes 18, 19, 20, 21, resistors 22, 23, 24, 25, 26, 27, capacitor 28 and the above-mentioned contact switches 5, 6 are mounted on circuit board 3. The circuit present in the vehicle contains the ignition locking switch 30, a push button switch 31 for manually switching on the anti-collision light system, a push button switch 32 for manually switching off the anti-collision light system, a protective resistor 33 for push button switch 32, a blinker unit 34, a pilot lamp 35 for the direction indicator, a pilot lamp 36 for the anti-collision light system, direction indicators 37 for travelling to the left, direction indicators 38 for travelling to the right, a blinker switch 34 for direction indication and a vehicle battery 40.

In Fig. 3, the circuit is shown in the rest state in which the contact switch 5, 6 is open

under the action of actuating member 9. If contact switch 5, 6 is closed, the capacitor 28 is charged and a voltage surge reaches the gate contact of thyristor 17. Consequently, the latter becomes conductive and current flows across resistor 26 and this continues when contact switch 5, 6 is opened again. This brings about a self-holding function. Diodes 18, 19, 20, 21 and resistors 22, 23, 24, 25 carry current, and thyristors 13, 14, 15, 16 become live. Only when the vehicle ignition is off is thyristor 13 in readiness in order, if necessary, to switch on the blinker unit 34. Thyristors 14 and 15 switch through in blinker rhythm the appropriate direction indicators 37 or 38. Thyristor 16 supplies current to the pilot lamp 36. Push button switch 31 is connected in parallel with contact switch 5, 6 and permits manual operation of the blinker unit in the same way and in the same sequence as this is done by contact switch 5, 6.

For the purpose of switching off the anti-collision light system, push button switch 32 must be operated, which operates a normally open contact and a normally closed contact, whilst thyristors 13 and 17 are extinguished if, in the meantime, contact switch 5, 6 and push button switch 31 have opened again.

CLAIMS

1. An acceleration limit value switch, for use on motor vehicles for controlling an anti-collision light system, of the kind having a cylindrically symmetrical permanently magnetic actuating member loosely carried on an iron plate and positioned with clearance within a coaxially arranged limiting tube and which acts on a switching element extending along the axis of cylindrical symmetry through a hole in the iron plate, said element under such loading keeping open a switch comprising a contact and an opposed restoring spring means, characterised in that there is provided a circular circuit board on the upper face of which are centrally mounted the iron plate and the limiting tube and about them the circuit members, and in that the switch contact and the leads are positioned on the underside of the circuit board, and in that the circuit board has centrally a hole for the switching element, and in that the leads and the circuit members form a circuit which can be switched on by the contact switch for controlling direction indicator lamps during operating of the anti-collision light system.

2. A switch, according to claim 1, comprising a circular base plate to the bottom of which there is centrally fitted a fixing member and round the edge of which there are distributed plugs which project from the base plate on the other side, said base plate having at the top a recess in which the equipped circuit board is fitted in form-locked manner with its bottom facing the base plate, whilst on the

- edge of the circuit board there are provided recesses for the individual rearward extension of the plugs and through which the latter project when the circuit board is fitted, solder-
- 5 ing pins being provided alongside said recesses on the top of the circuit board and, when the circuit board is mounted in the base plate, being electrically connected with the associated rearwards extensions of the plugs.
- 10 3. An acceleration limit value switch, for use on motor vehicles, substantially as described hereinbefore with reference to the accompanying drawings.

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